

Amendments to the claims:

This listing of claims replaces all prior versions and listings of claims in the application.

Please cancel claims 4, 16, 26, 28, and 30 without prejudice.

Listing of claims:

1. (Currently amended) ~~A program storage device~~An article of manufacture, comprising:

a program storage device having stored thereon program instructions executable by a processing device to perform operations for estimating motion trials in video image sequences, the operations comprising:

providing data points representing information from an image sequence;

and

performing regression clustering using a K-Harmonic Means function to cluster the data points and to provide motion information regarding the data points[.];

wherein the performing regression clustering includes:

selecting a number of regression clusters, K, for data points from an image sequence;

initializing regression functions for each of the K clusters to estimate the centers of motion for the data points;

calculating the distances from each data point to each of the K regression functions;

calculating a membership probability and a weighting factor for each data point based on distances between the K regression functions and each data point;

applying regression clustering using a K-Harmonic Means function to recalculate the K regression functions;

comparing a change in membership probability and a change in the K regression function to a predetermined threshold; and

using motion paths represented by the K regression functions when the change in membership probability and change in the K regression function are less than a predetermined threshold.

2. (Original) The program storage device of claim 1, wherein the performing regression clustering using the K-Harmonic Means function to cluster the data points and to provide motion information regarding the data points further comprises providing motion vectors for the data points.

3. (Original) The program storage device of claim 1, wherein the performing regression clustering using the K-Harmonic Means function to cluster the data points and to provide motion information regarding the data points further comprises providing at least one motion path for the data points.

4. (Cancelled)

5. (Currently amended) The program storage device of claim 1 [[4]], wherein the initializing regression functions for each of the K clusters further comprises randomly initializing regression functions for each of the K clusters.

6. (Currently amended) The program storage device of claim 1 [[4]], wherein the program instructions further include instructions for performing the operations comprising repeating the calculating the distances, the calculating membership probability and weighting factors, and applying regression clustering until the change in membership probability and change in the K regression function is not less than the predetermined threshold.

7. (Currently amended) The program storage device of claim 1 [[4]], wherein the weighting factor is chosen to allow the K regression functions to be optimized with less sensitivity to initialization of the K regression functions.

8. (Currently amended) The program storage device of claim 1 [[4]] further comprising extracting data according to a predetermined criteria to provide the data points.
9. (Original) The program storage device of claim 8, wherein the extracting data according to the criteria comprises portioning data according to color.
10. (Currently amended) The program storage device of claim 1 [[4]], wherein the program instructions further include instructions for performing the operations comprising preparing each of the data points as x-y-coordinate data points.
11. (Currently amended) The program storage device of claim 1 [[4]], wherein the program instructions further include instructions for performing the operations comprising using the K regression functions to render the image sequence with motion paths shown on a display.
12. (Original) The program storage device of claim 11, wherein the using the K regression functions to render the image sequence further comprises overlaying the K regression functions on the video images to show motion between the image sequences.
13. (Currently amended) A system for estimating motion trials in video image sequences, comprising:
- an image sequence retrieval module for retrieving a current image and a first reference image and providing data points representing information from the current image and the first reference image; and
 - a motion estimator, coupled to the image sequence retrieval module, for performing regression clustering using a K-Harmonic Means function to cluster the data points and to provide motion information regarding the data points[[.]] ;
- wherein the motion estimator performs regression clustering by selecting a number of regression clusters, K, for data points from an image sequence, initializing

regression functions for each of the K clusters to estimate the centers of motion for the data points, calculating the distances from each data point to each of the K regression functions, calculating a membership probability and a weighting factor for each data point based on distances between the K regression functions and each data point, applying regression clustering using a K-Harmonic Means function to recalculate the K regression functions, comparing a change in membership probability and a change in the K regression functions to a predetermined threshold and using motion paths represented by the K regression functions when the change in membership probability and change in the K regression function are less than a predetermined threshold.

14. (Original) The system of claim 13, wherein the motion information regarding the data points further comprises motion vectors for the data points.

15. (Original) The system of claim 13, wherein the motion information regarding the data points further comprises at least one motion path for the data points.

16. (Cancelled)

17. (Currently amended) The system of claim 13 ~~[[16]]~~, wherein the motion estimator randomly initializes regression functions for each of the K clusters.

18. (Currently amended) The system of claim 13 ~~[[16]]~~, wherein the motion estimator repeats the calculation of the distances, the membership probability and weighting factors, and applies regression clustering until the change in membership probability and change in the K regression function is not less than the predetermined threshold.

19. (Currently amended) The system of claim 13 ~~[[16]]~~, wherein the weighting factor is chosen to allow the K functions to be optimized with less sensitivity to initialization of the K regression functions.

20. (Currently amended) The system of claim 13 [[16]], wherein the motion estimator extracts data according to predetermined criteria.

21. (Original) The system of claim 20, wherein the motion estimator extracts data according to color.

22. (Currently amended) The system of claim 13 [[16]], wherein the image sequence retrieval module prepares each of the data points as x-y-coordinate data points.

23. (Currently amended) The system of claim 13 [[16]] further comprising a processor for using the K regression functions to render the image sequence with motion paths shown on a display.

24. (Original) The system of claim 23, wherein the processor overlays the K regression functions on the video images to show motion between the current image and the first reference image.

25. (Currently amended) A method for estimating motion trials in video image sequences, the method comprising:

providing data points representing information from an image sequence; and
performing regression clustering using a K-Harmonic Means function to cluster the data points and to provide motion information regarding the data points[[]]

wherein the performing regression clustering further comprises:

selecting a number of regression clusters, K, for data points from an image sequence;

initializing regression functions for each of the K clusters to estimate the centers of motion for the data points;

calculating the distances from each data point to each of the K regression functions;

calculating a membership probability and a weighting factor for each data point based on distances between the K regression functions and each data point;

applying regression clustering using a K-Harmonic Means function to recalculate the K regression functions;

comparing a change in membership probability and a change in the K regression functions to a predetermined threshold; and

using motion paths represented by the K regression functions when the change in membership probability and change in the K regression functions are less than a predetermined threshold.

26. (Cancelled)

27. (Currently amended) A system for estimating motion trials in video image sequences, comprising:

means for retrieving a current image and a first reference image and providing data points representing information from the current image and the first reference image; and

means for performing regression clustering, coupled to the means for retrieving and providing, wherein the means for performing regression clustering uses a K-Harmonic Means function to cluster the data points and to provide motion information regarding the data points[.].

wherein the means for performing regression clustering further comprises means for selecting a number of regression clusters, K, for data points from an image sequence, means for initializing regression functions for each of the K clusters to estimate the centers of motion for the data points, means for calculating the distances from each data point to each of the K regression functions, means for calculating a membership probability and a weighting factor for each data point based on distances between the K regression functions and each data point, means for applying regression clustering using a K-Harmonic Means function to recalculate the K regression functions, means for comparing a change in membership probability and a change in the K

regression functions to a predetermined threshold and means for using motion paths represented by the K regression functions when the change in membership probability and change in the K regression functions are less than a predetermined threshold.

28. (Cancelled)

29. (Currently amended) A system for estimating motion trials in video image sequences, comprising:

means for storing a current image and a first reference image;

means, coupled to the means for storing, for retrieving and providing data points representing information from the current image and the first reference image; and

means, coupled to the means for retrieving, for performing regression clustering using a K-Harmonic Means function to cluster the data points and to provide motion information regarding the data points.

wherein the means for performing regression clustering includes:

means for selecting a number of regression clusters, K, for data points from an image sequence,

means for initializing regression functions for each of the K clusters to estimate the centers of motion for the data points,

means for calculating the distances from each data point to each of the K regression functions,

means for calculating a membership probability and a weighting factor for each data point based on distances between the K regression functions and each data point,

means for applying regression clustering using a K-Harmonic Means function to recalculate the K regression functions,

means for comparing a change in membership probability and a change in the K regression functions to a predetermined threshold; and

means for using motion paths represented by the K regression functions when the change in membership probability and change in the K regression functions are less than a predetermined threshold.

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30. (Cancelled)